WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: AR3641

Title: Critical Evaluation of TMDL Data Requirements for Agricultural Watersheds

Focus Categories: Non Point Pollution, Models

Keywords: Modeling, Nonpoint Source Pollution, Total Maximum Daily Loads

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Abstract

Water quality models are frequently used to estimate NPS pollutant loads from watersheds and to predict stream response to various pollutant loading scenarios. Models are also used to estimate TMDLs from point and nonpoint sources that will result in desired optimum water quality improvement with minimum TMDL implementation cost. Because intensive monitoring of watersheds is very expensive, it is important that model estimates of effectiveness of various Best Management Practices (BMPs) are accurate so that costly mistakes of developing inaccurate, or sometimes, unattainable water quality goals can be avoided. Because the accuracy of model prediction is directly dependent upon how well the model works in certain land use, soil, and hydrologic conditions, it is important to validate these models using the data obtained from watersheds in Arkansas. It is imperative that spatial and temporal input data requirements of such models are evaluated so that effective watershed monitoring plans can be developed.

The specific objectives of this research are to: (1) perform an assessment of currently available water quality models using data from Lincoln Lake watershed, and (2) evaluate the optimum scale of temporal and spatial input data requirements for TMDL development.

This research will be conducted using the data from Lincoln Lake Watershed in Arkansas. The project will be carried out in two phases. In the first phase we will calibrate and validate NPS models to identify those that work best in the Ozark Plateau Region of Arkansas. In addition, we will perform error analyses to identify potential sources of errors affecting model predictions. In the second phase we will evaluate the

optimum scale of input data needed to predict NPS pollution and to develop TMDL with high degree of accuracy. We will develop and maintain a web-site for the project where all the research results and GIS-data will be published.

Validating the currently available NPS models for watersheds in the Ozark Plateau Region of Arkansas will enable us to develop TMDLs efficiently. Because cost of TMDL development is directly related to complexity of the model used and spatial and temporal resolution of input data required to make accurate predictions, critical evaluation of input data requirements will assist watershed managers in developing watershed monitoring plan needed to develop TMDL with high degree of confidence and minimum implementation cost. The method developed in this research will be applicable to other watersheds impaired by sediment and nutrients and will serve as a template against which NPS modeling for other watersheds can be done.